

Preventability of death in a medical ICU in a developing country

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On November 15th 1990, an Alitalia flight from Milan, crashed into a wooded hill while attempting to land at Zurich's Kloten airport. The plane was torn to shreds - various parts strewn all over the hilly terrain between the villages of Stadel and Weiach. There were 40 passengers and 6 crew on board and none of them survived.

A few years later, I visited the site to pay my respects to a departed friend, who had boarded the ill-fated flight. As I gazed at the steep cliff, shorn of all vegetation, I turned to my companion, who happened to be a pilot, and asked if flying could ever be 100% safe. "Not as long as human beings are involved," he answered, explaining that most crashes are caused by human error. Even if the cutting edge technology may prevent all equipment failures, human beings would remain fallible. So despite many checks including counter checks and safety drills, the aviation industry-or in fact, any industry-will never be devoid of risk. To substantiate his observation-according to the 2013 International Civil Aviation Organization safety report, the number of worldwide accidents for that the specified year for the jet commercial aircrafts was 99 with 372 fatalities.

The same logic can be applied to medicine as well. A patient's safety in medicine is a growing concern since the publication of 'Medical Nemesis' by Ivan Illich in 1975^[1] and later the Harvard Medical Practice Publication in 1991, which revealed that the adverse events (AE) in 4% of the 30,000 hospital medical records retrospectively reviewed of which 2/3rds were deemed preventable.^[2,3] Figures that are more staggering were reported in a subsequent article 'To Err Is Human'.^[4] It stated that AE attributable to errors when extrapolated to 33.6 million

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admissions to the U.S. hospitals that the specified year implied that 44,000–98,000 deaths every year was caused by medical errors. This created a public outcry leading to patient safety a serious concern. Similarly, the publication of the 'Quality in Australian Healthcare Study' in 1995[^] (as quoted in BMJ)^[5] identified incidents of 16.6% AE in 28 hospitals of which 18.4% resulted in death or a permanent disability. The revelation that 51% were considered preventable did not augur well for the future of safe medical practice.

Dorman draws a parallel between healthcare and other safety-focused industries stating, "humans will miss things and systems and so must be designed with this principal in mind". He cites a simple mathematical formula of $(\% \text{ }^n) \times 100$. "The '%' is the percent likelihood of getting each step correct and 'n' is the number of independent steps. Thereby, if we assume that getting each step correct occurs with the probability of 0.99 and there are 50 steps in the process or a procedure then we will get it completely right about 61% of the time. Further, he mentions that at his institution when they did a flow map of all steps from the decision to give an antibiotic through to its actual administration they found that the process included more than 70 steps. Stated otherwise, they had a system designed such that failure had to happen. I hope it is now easy to see how all our systems need to be re-examined and we need to remove

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complexity wherever possible".^[6]

In the Intensive Care Unit where critical illness is already associated with high morbidity and mortality, any accidental error related to human factor or otherwise could worsen the outcome. Regrettably, these fatal or near miss accidents could have been averted if the patient had received an established standard of care appropriate for that time. If this is the definition of preventable death,^[7] we have to accept the irony that the standards of care may vary over a period. Activated protein C and degree of glucose control, for instance, have not been consistent with guidelines over a time span. Further, the effects of errors cannot be easily distinguished from the progression of disease and the complexity of complication in critically ill patients.

According to the definition of preventable death, one should also be careful about how we view a complication causing death. For instance, a subclavian puncture for central line placement can inadvertently cause pneumothorax resulting in death. This should not necessarily be called a preventable mortality provided it fulfills the following:

- Justification for the procedure and the site of puncture
- The operator has acquired the reasonable skill
- Knowing the high risk of procedure, all possible precautions including sonographic guidance have been taken
- A postoperative check x-ray has been done.

The AE and preventable deaths in ICU is an universal phenomenon not just limited to developing countries. However, certain adverse forces quintessential to teaching hospitals in developing countries, left uncorrected, play a distinctive role in the increasing incidents of AE. Limited resources and inadequate nurse-patient ratio are two major drawbacks and both ultimately stem from economic constraints. Hospital with under-skilled, underpaid and overworked healthcare professionals are a breeding ground for AE.

Preventable ICU deaths have been studied widely. Various methods of evaluation^[8,9] could be the reason for the wide variation from 6-21% of reported ICU preventable death rates in the world literature. These methods include:

- Analysis of retrospective but selective chart reviews during regular mortality-morbidity meets (this is the most common method in our hospitals)

- Retrospective study of all ICU records over a year is very laborious and time consuming^[10]
- Routine reporting of AE by concerned healthcare workers in the unit but discreetly avoiding sanctions in the reporting system somewhat akin to the Danish Society for Patients Safety system in Australia^[11]
- Prospective evaluation by direct observation (perhaps the best available method to identify AE as it presents the least underreporting).^[12]

Zeggwagh et al^[13], study based on prospective evaluation in the current issue is to be highly commended for its thoroughness in the methodology applied. More importantly, the prospective study was analyzed immediately after the occurrence of an AE. Retrospective studies revealing past medical records are handicapped because of insufficient medical data recorded in the files and improper documentation; further, the physician/nurse may no longer be available in person to verify the events.^[14] A pertinent point raised in this study is the high incidents of Health Associated Infections, which is probably true of most ICUs. Nosocomial infection in the ICU can occur despite all general precautions and observation-approved guidelines, and hence it becomes impossible to identify a specific error attributable to death.

Another vagary of doing a study of this kind is the entity of attributable mortality *vis-a-vis* using a preventable scoring table. Besides the two highest scores of the table (i.e., strong evidence or virtually certain evidence of preventability), all other scores are very subjective.

In our hospital, there are two obvious reasons for preventable errors. Lack of communication and delay in 'response time'. Communication failure is the number one human error resulting in airplane crashes and evidence suggests that communication failure are also responsible for many hospital related AE.^[15-17] Rapid response time was first addressed by organizing a Medical Emergency Team in Liverpool Hospital in Sydney in 1989.^[18] The concept was based on earlier identification of seriously ill patients at risk and responding rapidly to prevent a serious AE. To prevent AE in ICU, one has to address problems earlier, even before patients are transferred to ICU. To this effect, most hospitals have a 'Blue Code', which essentially responds only to calls after a patient has had an arrest which may be too late and may add to the morbidity of transferring brain damaged patients to the ICU. Instead the nurses in the general ward should be trained to recognize early signs of impending catastrophe (serious fluctuations

in HR, RR, blood pressure or level of consciousness) and sound the Blue Code,^[19] remember - 'lucky is the man for whom the bell tinkles before it tolls'.

To summarize, the premise that we tend to make mistakes, can help prevent them. We must stop blaming a dedicated workforce and instead look at failures as a way to gain insight into the chinks in the healthcare system. The DSPS seems to have found a workable solution.^[11] Under the Denmark's safety act, all healthcare professionals and other stakeholders have a duty to report patients safety incidents from all section of healthcare to a database without fearing sanctions against those reported. Between the years 2011-12, the database received 155,791 reports. Though many of the incidents reported may not merit further scrutiny by the board, at least 30% of the reports were sufficiently detailed for analysis. More importantly, this large database suggests a growing willingness to report mistakes.

However, without a similar safety act and maintaining a healthcare professionals' anonymity, such a database might deter people from reporting mistakes and lead to an endless blame game. Further, in today's world where right to information is the prerogative of the patient/relative, the potential for litigation looms high and can substantially influence the behavior of the most well meaning physician. Frequently, the media also headlines horrific cases of medical nemesis - which is perhaps necessary, as what they report is only the tip of the iceberg. However, their gravest injustice lies in singling out an individual as defaming a prominent personality is good fodder for gossip. Had the reporter probed further they would disclose a fault line running deep through our healthcare system.

The challenge ahead, is to effectively improve the prevailing system across the entire organization and not be restricted to individual departments. Evidence based protocols and guidelines are destined to fail without inculcating a culture of safety amongst healthcare professionals in our hospitals. Further, institutions must be deeply committed to analyzing all AE.

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